Software version TC3.0
MARCH 2010

PrecisionHD 1080p
12X/4X

PrecisionHD 720p

PrecisionHD Camera User Guide

What's in this guide?

The top menu bar and the entries in the Table of Contents are all hyperlinks, just click on them to go to the topic.

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Table of Contents

Introduction

Introduction 5
- The purpose of this document 5
- Products covered in this guide 5
- Disclaimers and Notices 5
- Other documents you might find useful 5

The physical interface

The PrecisionHD 1080p 12X/4X camera 7
- HDMI and HD-SDI* 7
- Camera control 7
- Power 7
- Extra camera* 7
- Ethernet 7
- Kensington lock 7

The PrecisionHD 720p camera 8
- HDMI 8
- Camera control 8
- Power 8
- Extra camera 8
- Kensington lock 8

About cables

Camera cables 10
- HDMI cable 10
- HD–SDI cable 10
- HDMI to DVI–D adapter 10
- Making your own cables 10

Connecting the camera to the codec

Codec C20 configurations 12
- Using the camera with Quick Set C20/C20plus 12
  - How to connect the camera 12
- Using the camera with Profile having Codec C20 12
  - How to connect the camera 12

Codec C40 configurations 12
- Using the camera with Codec C40 12
  - How to connect the camera 12

Codec C60 configurations 12
- Using the camera with Codec C60 12
  - How to connect the camera 12
- Using the camera with Profile having Codec C60 12
  - How to connect the camera 12

Codec C90 configurations 13
- Using the camera with Codec C90 13
  - How to connect the camera 13
- Using the camera with Profile having Codec C90 13
  - How to connect the camera 13

Video output formats

TANDBERG PrecisionHD 1080p 12X/4X 15
- Video output formats 15
- DIP switch settings for video output formats 15
- Line voltage frequency 15
- The PrecisionHD 1080p video formats DIP switch table 15

Daisy chaining of the cameras

Daisy chaining of the PrecisionHD 1080p 12X/4X 17

Daisy chaining of the PrecisionHD 720p 18

Appendices

TANDBERG PrecisionHD 1080p 12X/4X camera 20
Controlling cameras using the VISCA™ protocol 20
RS–232 Parameters 20
RS–232 Commands and inquiries 20

The VISCA™/RS–232 control protocol 21
VISCA message format 21
Network and interface commands 22
Push messages 22
Camera commands 23
PTZF - movement commands 24
Inquiries 25
Software upload commands 26
Debug commands for TANDBERG cameras 26
Other commands 26
Video mode selection 27
DIP Switch 27

Technical specifications 28
TANDBERG PrecisionHD 1080p 12X/4X cameras 28
TANDBERG PrecisionHD 1080p 12X 28
TANDBERG PrecisionHD 1080p 4X 28
TANDBERG PrecisionHD 720p camera 28

Chapter 1

Introduction

PrecisionHD 1080p
12X/4X

PrecisionHD 720p

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Introduction

You may already be familiar with the administrator guides for the Profiles and Codec C–series. To help you find the information you need, TANDBERG has split the information into smaller and more accessible parts listed on the right of this page.

The purpose of this document

The purpose of this document is to describe the camera matters specific to the PrecisionHD 1080p/720p cameras, used together with the TANDBERG endpoints. The guide is mainly focused on the PrecisionHD 1080p 12X/4X cameras, which are used together with the Profile 42”/52”/65”, the QuickSet C20/C20plus and the Codec C–series. Some information about the PrecisionHD 720p is also included.

Disclaimers and Notices

The objective of this documentation is to provide the reader with assistance in using and configuring the product. The capabilities of TANDBERG products and other manufacturers’ products change over time and so the required configuration may be different from that indicated here. If you have any suggestions for changes to this document, please feed them back to TANDBERG through your TANDBERG Authorized Service Representative.

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Products covered in this guide

- TANDBERG PrecisionHD cameras:
  - TANDBERG PrecisionHD 1080p 12X/4X cameras
  - TANDBERG PrecisionHD 720p camera

Other documents you might find useful

- ***Video conference room primer guide***
- ***Getting started guide*** for Profile Series, Codec C Series, Quick Set C20
- ***User Guide*** for Profile Series, Codec C Series and Quick Set C20
- ***Administrator guide*** for Profiles using Codec C20 and Quick Set C20
- ***Administrator guide*** for Profiles using Codec C60 and Codec C60
- ***Administrator guide*** for Profiles using Codec C90 and Codec C90
- ***Administrator guide*** for Codec C40
- ***Safety instructions*** for Profile Series, Codec C Series and Quick Set C20
- ***Legal information*** for Profile Series, Codec C Series and Quick Set C20
- ***Camera user guide*** for PrecisionHD 1080p/720p
- ***API guides*** for Codec C90, C60, C40
- ***Physical interfaces guides*** for Codec C90, C60, C40

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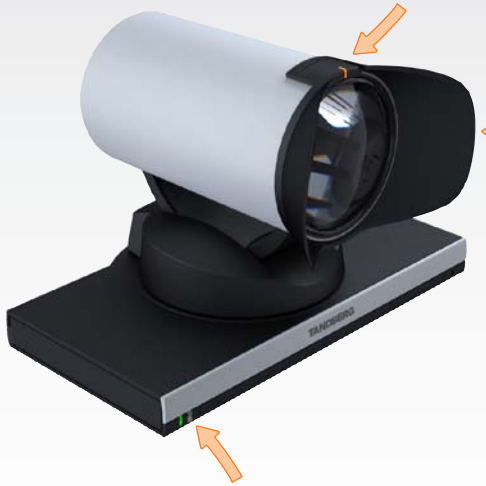
Chapter 2

The physical interface

PrecisionHD 1080p
12X/4X

PrecisionHD 720p

The PrecisionHD 1080p 12X/4X camera



The orange LED illuminates while in a call and flickers when there is an incoming call.

The lens hood is detachable.

We recommend that you mount it to prevent stray light from disturbing your video experience.

Snap it on gently.

The green LED is continuously illuminated when power is On, but it flickers when receiving signals from the remote control.

When mounted (upside down) in the Profile 65" and the Profile 65" Dual, the LED is not visible.

HDMI and HD-SDI*

- HDMI is the main video source. The maximum resolution is 1080p60.
- HD-SDI is the secondary video source. The maximum resolution is 1080p30.
- The HDMI and HD-SDI can be used simultaneously. The maximum resolution is 1080p30, if you want both to run with the same resolution.

Camera control

Camera control is used for controlling the pan, tilt and zoom, and for powering up the camera.

Power

- When the camera is used with a TANDBERG Codec, power will be supplied through Camera Control cable.
- When the camera is used with non-TANDBERG codecs, you may have to connect power separately.

Extra camera*

If you want to connect cameras in a daisy chain:

- The first camera in the chain is powered by the camera control cable. The next must use the 12V DC Power in.
- Use an extra camera cable between the Extra Camera sockets.

Ethernet

For software upgrades on daisy chained cameras. Requires software version TC3.0 or higher on the Codec C–series. See the TANDBERG PrecisionHD 12x Ethernet Upgrade Application Note for details. Go to: ▶ http://www.tandberg.com/docs

Kensington lock

The Kensington lock may be used to prevent the camera to be moved from its place or to prevent theft.

* Not supported with Codec C20

The PrecisionHD 720p camera

The orange LED illuminates while in a call and flickers when there is an incoming call.

The lens hood (not mounted on the camera in the picture) is detachable.

We recommend that you mount it to prevent stray light from disturbing your video experience.

Snap it on gently.

The green LED is continuously illuminated when power is On, but it flickers when receiving signals from the remote control.

HDMI

- HDMI is the main video source. The maximum resolution is 720p30.

Camera control

Camera control is used for controlling the pan, tilt and zoom, and for powering up the camera.

Power

- When the camera is used with a TANDBERG Codec, power will be supplied through Camera Control cable.
- When the camera is used with non-TANDBERG codecs, you may have to connect power separately.

Extra camera

If you want to connect cameras in a daisy chain*:

- The first camera in the chain is powered by the camera control cable. The next must use the 12V DC Power in.
- Use an extra camera cable between the Extra Camera sockets.

Kensington lock

The Kensington lock may be used to prevent the camera to be moved from its place or to prevent theft.

* Not supported with Codec C20

Chapter 3

About cables

PrecisionHD 1080p
12X/4X

PrecisionHD 720p

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Camera cables

HDMI cable

The HDMI cable delivered with the camera is 5 meters.

Maximum length is 15 meter with a category 2 certified good quality HDMI cable.

HD–SDI cable

The HD-SDI cable must be purchased separately. The maximum recommended length of HD–SDI cable is 100 meters.

HDMI to DVI–D adapter

The HDMI to DVI–D adapter is used when connecting to a TANDBERG MXP Codec or TANDBERG Video Switch.

Making your own cables

If you must assemble your own cables, the tables show the pin-out required.

Pin-out—VISCA Camera control RJ45 8 pins shielded modular jack

Pin	*Signal name*
8	+12V (2.8mA current source when connected in daisy chain)
7	GND
6	TXD (out)
5	NC (no connect)
4	NC (no connect)
3	RXD (in)
2	GND
1	+12V

Pin-out—VISCA Daisy chain RJ11 6 pins modular jack

Pin	*Signal name*
6	GND
5	GND
4	RXD (in)
3	TXD (out)
2	Presence (12V in daisy chain)
1	GND

Pin-out—TANDBERG camera cable RJ45 (8 pin) to D-SUB

Signal name	*RJ45 pin*		*D-SUB pin*
+12Vdc	1	Twisted pair	4
GND	2		5
RX	3	Twisted pair	2
TX	6		3
NC	4	Twisted pair	1
NC	5		6
GND	7	Twisted pair	5
+12Vdc	8		4

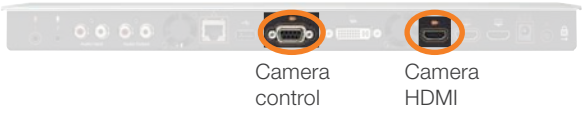
Chapter 4

Connecting the camera to the codec

PrecisionHD 1080p
12X/4X

PrecisionHD 720p

Codec C20 configurations



Using the camera with Quick Set C20/C20plus

- The TANDBERG Quick Set C20, using the Codec C20, includes the PrecisionHD 1080p 4X zoom with 1080p30 maximum resolution.
- The TANDBERG Quick Set C20plus, using the Codec C20, includes the PrecisionHD 1080p 12X zoom with 1080p60 maximum resolution.

How to connect the camera

Connect the HDMI cable (HDMI to HDMI):

- From the ***HD VIDEO OUT*** (HDMI) connector on the camera.
- To the ***CAMERA*** (HDMI) connector on the Codec C20.

Connect the camera control cable (RJ45 to RS–232):

- From the ***CODEC CONTROL IN*** (RJ45) connector on the camera.
- To the ***CAMERA CONTROL*** (RS–232) connector on the Codec C20. Visca™ protocol is supported.

Using the camera with Profile having Codec C20

The ***TANDBERG Profile 42”***, using the Codec C20, includes the PrecisionHD 1080p 12X zoom with 1080p60 maximum resolution.

How to connect the camera

The camera cables are pre-mounted on the Profile room systems.

Codec C40 configurations

Using the camera with Codec C40

- The TANDBERG Codec C60 includes the PrecisionHD 1080p 12X zoom with 1080p60 maximum resolution.
- The Codec C60 can also be used with PrecisionHD 720p with 1280x720p30 maximum resolution.

How to connect the camera

Connect the HDMI cable (HDMI to HDMI):

- From the ***HD VIDEO OUT*** (HDMI) connector on the camera.
- To the ***HDMI 1 IN*** (HDMI) connector on the Codec C40.

Connect the camera control cable (RJ45 to RS–232):

- From the ***CODEC CONTROL IN*** (RJ45) connector on the camera.
- To the ***CAMERA CONTROL*** (RS–232) connector on the Codec C40.

Codec C60 configurations

Using the camera with Codec C60

- The TANDBERG Codec C60 includes the PrecisionHD 1080p 12X zoom with 1080p60 maximum resolution.
- The Codec C60 can also be used with PrecisionHD 720p with 1280x720p30 maximum resolution.

How to connect the camera

Connect the HDMI cable (HDMI to HDMI):

- From the ***HD VIDEO OUT*** (HDMI) connector on the camera.
- To the ***HDMI 1 IN*** (HDMI) connector on the Codec C60.

Connect the camera control cable (RJ45 to RS–232):

- From the ***CODEC CONTROL IN*** (RJ45) connector on the camera.
- To the ***CAMERA CONTROL*** (RS–232) connector on the Codec C60. Visca™ protocol is supported.

Using the camera with Profile having Codec C60

The TANDBERG Profile 42”/52”/65” with Codec C60 includes the PrecisionHD 1080p 12X zoom with 1080p60 maximum resolution.

How to connect the camera

The camera cables are pre-mounted on the Profile room systems.

Codec C90 configurations

HDMI 1

Camera control

Using the camera with Codec C90

- The TANDBERG Codec C90 includes the PrecisionHD 1080p 12X zoom with 1080p60 maximum resolution.
- The Codec C90 can also be used with PrecisionHD 720p with 1280x720p30 maximum resolution.

How to connect the camera

Connect the HDMI cable (HDMI to HDMI):

- From the ***HD VIDEO OUT*** (HDMI) connector on the camera.
- To the ***HDMI 1 IN*** (HDMI) connector on the Codec C90.

Connect the camera control cable (RJ45 to RS–232):

- From the ***CODEC CONTROL IN*** (RJ45) connector on the camera.
- To the ***CAMERA CONTROL*** (RS–232) connector on the Codec C90. Visca™ protocol is supported.

Using the camera with Profile having Codec C90

The TANDBERG Profile 65” with Codec C90 includes the PrecisionHD 1080p 12X zoom with 1080p60 maximum resolution.

How to connect the camera

The camera cables are pre-mounted on the Profile room systems.

Chapter 5

Video output formats

PrecisionHD 1080p
12X/4X

TANDBERG PrecisionHD 1080p 12X/4X

Video output formats

NOTE: The information on this page applies to the PrecisionHD 1080p 12X/4X camera, and describes how to set the DIP switches 1–5 to configure the camera for different video output formats.

DIP switch settings for video output formats

The DIP switch sets the video output format for the camera. The DIP switch is on the underside of the camera. The default setting is Auto. See the table to the right.

- Maximum resolution for HDMI is:
  - 1080p60 for PrecisionHD 1080p 12X zoom
  - 1080p30 for PrecisionHD 1080p 4X zoom
- Maximum resolution for HD-SDI* is 1080p30.

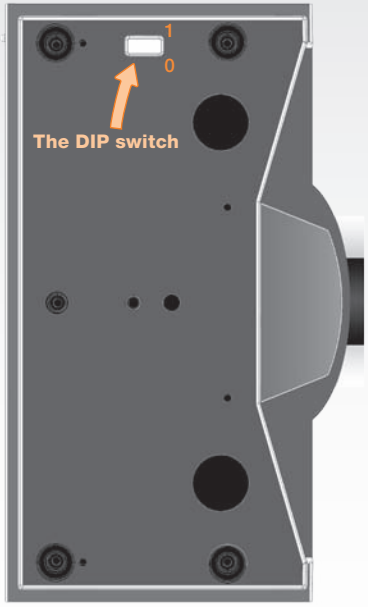
Line voltage frequency

The camera will automatically detect the line voltage frequency when it is 50 or 60 Hz. If there is a different line voltage, you can set the video output format to a specific value (use the DIP switches) to override the auto frequency detection.

Set the PrecisionHD 1080p DIP switch (country specific setting):

- 50Hz: 00011, gives 1080p50 (720p50 for HD-SDI)
- 60Hz: 00100, gives 1080p60 (720p60 for HD-SDI)

The PrecisionHD 1080p video formats DIP switch table



Underside side of the TANDBERG PrecisionHD 1080p camera

DIP Switch table for video formats						
1	*2*	*3*	*4*	*5*	*HDMI*	*HD-SDI**
0	0	0	0	0	Auto	
0	0	0	0	1	1920x1080p25	1920x1080p25
0	0	0	1	0	1920x1080p30	1920x1080p30
0	0	0	1	1	1920x1080p50	1280x720p50
0	0	1	0	0	1920x1080p60	1280x720p60
0	0	1	0	1	1280x720p25	1280x720p25
0	0	1	1	0	1280x720p30	1280x720p30
0	0	1	1	1	1280x720p50	1280x720p50
0	1	0	0	0	1280x720p60	1280x720p60
0	1	0	0	1	Software control	

The table shows the different settings available for the HDMI and the HD-SDI outputs.

Auto: Camera negotiates format over HDMI. HD-SDI tracks HDMI and defaults to 1080p30 in absence of HDMI sync.

Software: For more on the **Software control** setting, read about video mode selections in the TANDBERG PrecisionHD 1080p User Guide.

* Not supported with Codec C20

Chapter 6

Daisy chaining of the cameras

PrecisionHD 1080p
12X/4X

PrecisionHD 720p

Daisy chaining of the PrecisionHD 1080p 12X/4X

A single daisy chain with PrecisionHD 1080p 12X can have:

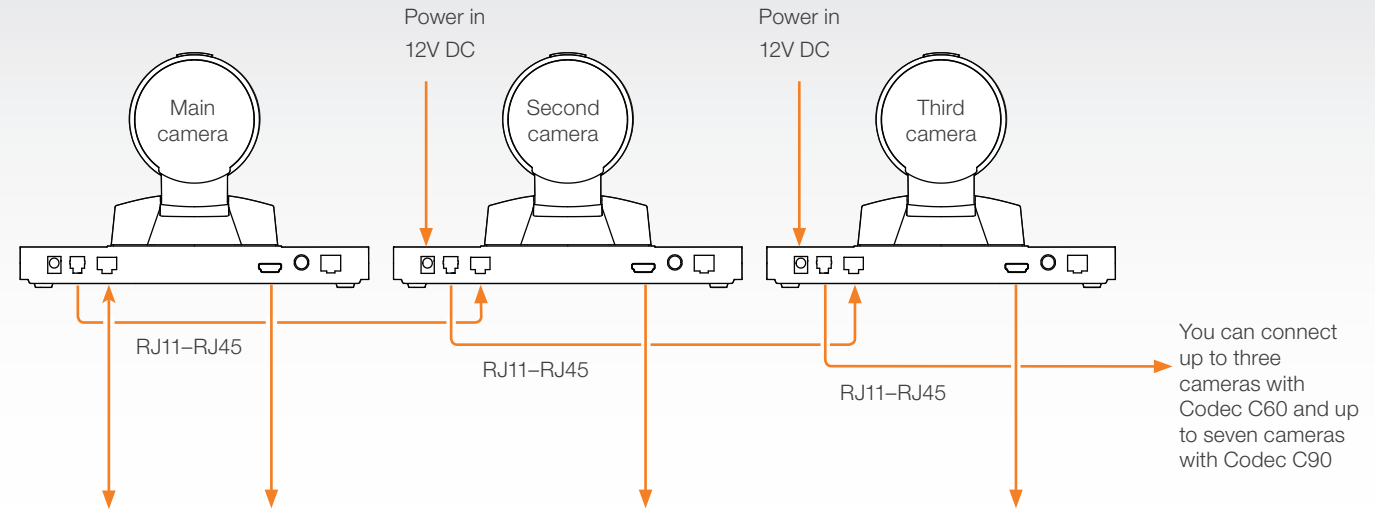
- Three cameras when using Codec C60.
- Seven cameras when using Codec C90.

The PrecisionHD 1080p 4X has daisy chain support, but can only be in the end of a chain.

Locate the Extra Camera and Power connectors.

- Power. The first camera in the chain is powered up from the codec by the VISCA camera control cable. Additional cameras must use the 12V DC **Power in**.
- Extra camera cable. The daisy chained cameras are connected by using the VISCA Extra Camera cable (maximum length 20 m / 65.6 ft) between the **Extra Camera In** and **Codec Control In** sockets.
- HDMI and HD-SDI. The **HDMI** and **HD-SDI** outputs can be used simultaneously on the same camera.

Example. TANDBERG PrecisionHD 1080p 12X/4X cameras in daisy chain.


Power in
12V DC
Power in
12V DC
Main camera
Second camera
Third camera
RJ11–RJ45
RJ11–RJ45
RJ11–RJ45
You can connect up to three cameras with Codec C60 and up to seven cameras with Codec C90
Connect to the **Camera Control** socket on the codec.
HDMI out: Connect to the Video Input 1 on the codec
HDMI out: Connect to the Video Input 2 on the codec
HDMI out: Connect to the Video Input 3 on the codec

VISCA™ is a trademark of Sony Corporation

Daisy chaining of the PrecisionHD 720p

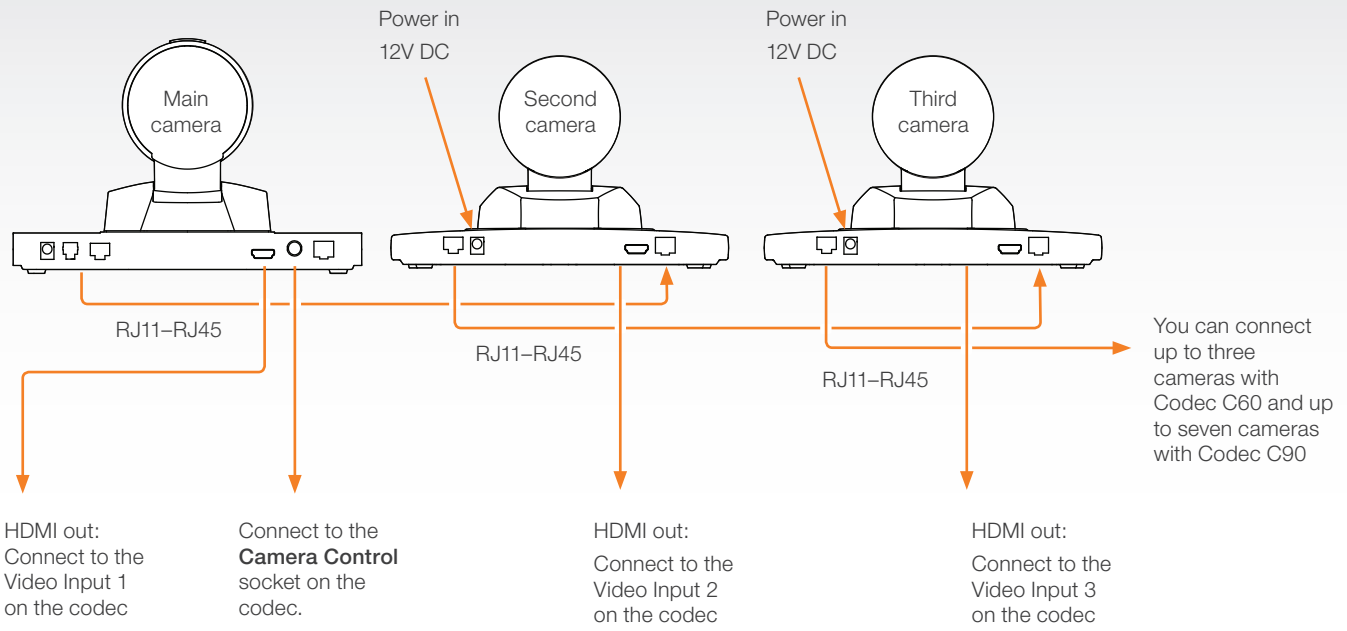
A single daisy chain can have:

- Three cameras when using Codec C60
- Seven cameras when using Codec C90.

Locate the Extra Camera and Power connectors.

- Power. The first camera in the chain is powered up from the codec by the VISCA camera control cable. Additional cameras must use the 12V DC **Power in**.
- Extra camera cable. The daisy chained cameras are connected by using the VISCA Extra Camera cable (maximum length 20 m / 65.6 ft) between the **Extra Camera** and **Codec Control** sockets

Example. TANDBERG PrecisionHD 720p cameras in daisy chain.


Power in
12V DC
Power in
12V DC
Main camera
Second camera
Third camera
RJ11–RJ45
RJ11–RJ45
RJ11–RJ45
You can connect up to three cameras with Codec C60 and up to seven cameras with Codec C90
HDMI out: Connect to the Video Input 1 on the codec
Connect to the Camera Control socket on the codec.
HDMI out: Connect to the Video Input 2 on the codec
HDMI out: Connect to the Video Input 3 on the codec

VISCA™ is a trademark of Sony Corporation

Chapter 7

Appendices

PrecisionHD 1080p
12X/4X

PrecisionHD 720p

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TANDBERG PrecisionHD 1080p 12X/4X camera

Controlling cameras using the VISCA™ protocol

NOTE: The information in this chapter applies to the TANDBERG PrecisionHD 1080p 12X/4X camera.

The camera uses an RS-232 control interface that resembles the Sony VISCA™ protocol. The VISCA protocol (VIdeo System Control Architecture) is a Sony protocol for synchronized control of multiple video peripherals.

VISCA™ is a trademark of Sony Corporation

RS–232 Parameters

At startup, the communication parameters for the RS–232 interface must be set to:

- 9600 bits per second
- 8 data bits
- No parity
- 1 stop bit
- No hardware flow control
- No software flow control

All the RS–232 parameters except speed are fixed and not user configurable. The speed may be changed by issuing the ***Speed command*** defined on the following pages.

All control bytes are pure binary information, i.e. the control bytes are not ASCII-encoded.

RS–232 Commands and inquiries

A list of all the available commands and inquiries together with the result and comments are found in the table on the following pages.

The VISCA™/RS–232 control protocol

When interfacing to the PrecisionHD 12X/4X 1080p, the codec uses an RS-232 control interface that resembles the Sony VISCA™ protocol.

VISCA message format

A particular command is recognized by the message information after the address byte.

Message Format

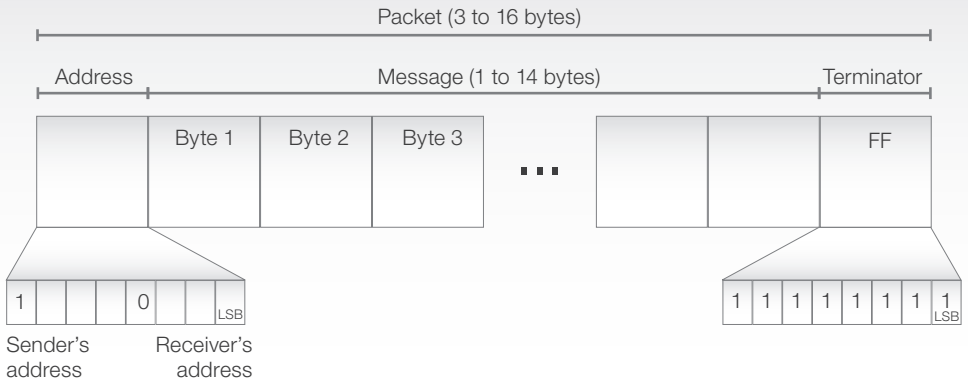
Commands are initiated from the host (i.e. the codec or any other external controller) to the camera.

After a camera has been issued a command, the camera will generate a response. Commands and responses (messages) have the following format:

- Address byte (1)
- Message bytes (1..14)
- Terminator byte (1)

See the illustration for details.

The RS232 Message format



The minimum length of any command or response is 3 bytes:

1. Address byte (1): Let us assume there is one host, i.e. the codec (the host is the unit controlling the camera). The host has address 0. The four least significant bits of the address byte contain the address of the receiver. In the case of a broadcast message, the receiver address must be set to 8. When we are operating a single camera, the address is 1. Hence, address bytes in messages from the host are 0x81, and messages from the camera to the host are 0x90 (the protocol allows for up to 7 cameras).
2. Message bytes (1..14): Any number of bytes containing the actual message information. Bytes may have any value in the range 0...254. The value 255 (i.e. hexadecimal FF) is reserved for the terminating byte.
3. Terminator byte (1): All messages must be terminated with a byte containing all 1's, i.e. decimal 255 (or hexadecimal FF).

Command and response exchange

When the camera receives a command, it responds with either:

- **Completion message:** 90-5Y-FF
  Returned by camera when execution of commands and inquiries are completed.
- **Error packets:** 90-6Y-..-FF
  Returned by camera instead of a completion message when command or inquiry failed to be executed.

  General error messages, unless otherwise specified:
  - **90-6Y-01-FF** Message length error (>14 bytes)
  - **90-6Y-02-FF** Syntax error
  - **90-6Y-03-FF** Command buffer full
  - **90-6Y-04-FF** Command cancelled
  - **90-6Y-05-FF** No socket (to be cancelled)
  - **90-6Y-41-FF** Command not executable
- **Y = socket numbe**r
  A camera may contain two buffers so that two commands, including the command being executed, can be received.

  NOTE: The PrecisionHD 1080p camera supports a single socket only. Consequently, the Y always assumes the value Y=0.

Exceptions to these rules:

- An Initialize message will respond as indicated in the Table of Commands (this message is in fact a broadcast message, and any unit other than the host receiving the broadcast message must pass it on).
- Do not route commands or replies that are longer than 16 bytes through Sony cameras. The easiest way to avoid this is to put the TANDBERG cameras first in the chain. Commands and replies that are longer than 16 bytes are clearly marked below.

The VISCA™/RS–232 control protocol, cont...

Network and interface commands

Command set	Command packet	Comments
IF_Clear	8x 01 00 01 ff	Clear command buffer. Stop any current operation in progress. Does not do much on Rover.
Address_Set	8x 30 0p ff	p = address for this device. If x=8 (broadcast), increase p with 1 before sending to chain.
Command_ Cancel	8x 2p ff	p = Socket ID. Rover does not support multiple sockets. Commands will always run to completion. Don't use it

Push messages

Messages sent from camera to controller.

Command set	Command packet	Reply and comments
Network_ Change	y0 38 ff	This indicates that cameras have been added to or removed from the chain. It is recommended to wait 9 seconds after receiving this message before doing a full reconfigure.
IR_Push	y0 07 7d 02 gg hh ff	If IR mode is on, IR codes received by the camera will be sent to the controller. gg = IR ID hh = keycode

The VISCA™/RS–232 control protocol, cont...

Camera commands

Command	Command Packet	Comments
Power_On	8x 01 04 00 02 ff	Power control. This command stores the zoom and focus value and reset these motors. Used for Tiger if the camera was on for a long time.
Power_Off	8x 01 04 00 03 ff	
Video_Format	8x 01 35 0p 0q 0r ff	Selects video format. p = reserved. q = video mode. r = See the chapter about the DIP switch settings
WB_Auto	8x 01 04 35 00 FF	WB: White Balance
WB_Table_Manual	8x 01 04 35 06 ff	
WB_Table_Direct	8x 01 04 75 0p 0q 0r 0s ff	Used if WBmode = Table manual pqrs = wb table.
AE_Auto	8x 01 04 39 00 FF	AE: Automatic Exposure.
AE_Manual	8x 01 04 39 03 FF	
Iris_Direct	8x 01 04 4B 0p 0q 0r 0s FF	Used if AE mode = Manual. pqrs: Iris position, range 0..50
Gain_Direct	8x 01 04 4c 0p 0q 0r 0s FF	Used if AE mode = Manual. pqrs: Gain position, values:12-21dB.
Backlight_On	8x 01 04 33 02 FF	BacklightCompensation mode
Backlight_Off	8x 01 04 33 03 FF	
Mirror_On	8x 01 04 61 02 ff	Sony calls this CAM_LR_Reverse. RR (FT/AT mirror command)
Mirror_Off	8x 01 04 61 03 ff	
Flip_On	8x 01 04 66 02 ff	Sony calls this CAM_ImgFlip.
Flip_Off	8x 01 04 66 03 ff	
Gamma_Auto	8x 01 04 51 02 ff	Gamma mode. Default uses gamma table 4.
Gamma_Manual	8x 01 04 51 03 ff	
Gamma_Direct	8x 01 04 52 0p 0q 0r 0s ff	pqrs: Gamma table to use in manual mode. Range 0-7.

Command	Command Packet	Comments
MM_Detect_On	8x 01 50 30 01 ff	Turn on the Motor Moved Detection (camera recalibrates if touched)
MM_Detect_Off	8x 01 50 30 00 ff	Turn off the Motor Moved Detection (camera does not recalibrate if touched)
Call_LED_On	8x 01 33 01 01 ff	Refers to orange LED on top of camera. Will always be off at startup.
Call_LED_Off	8x 01 33 01 00 ff	
Call_LED_Blink	8x 01 33 01 02 ff	
Power_LED_On	8x 01 33 02 01 ff	Green power LED. If switched to off and stored to startup profile, it will always be off.
Power_LED_Off	8x 01 33 02 00 ff	
IR_Output_On	8x 01 06 08 02 ff	See IR push message.
IR_Output_Off	8x 01 06 08 03 ff	
IR_CameraControl_On	8x 01 06 09 02 ff	Lets up/down/left/right/zoom+/- on the IR remote control the camera directly. Those keycodes will be sent to the controller if IR Output is on.
IR_CameraControl_Off	8x 01 06 09 03 ff	

The VISCA™/RS–232 control protocol, cont...

PTZF - movement commands

Command	Command Packet	Comments
Zoom_Stop	8x 01 04 07 00 ff	
Zoom_Tele	8x 01 04 07 2p ff	p = speed parameter, a (low) to b (high)
Zoom_Wide	8x 01 04 07 3p ff	
Zoom_Direct	8x 01 04 47 0p 0q 0r 0s ff	pqrs: zoom position
ZoomFocus_Direct	8x 01 04 47 0p 0q 0r 0s 0t 0u 0v 0w ff	pqrs: zoom position tuvw: focus position
Focus_Stop	8x 01 04 08 00 ff	
Focus_Far	8x 01 04 08 2p ff	p = speed parameter, a (low) to b (high)
Focus_Near	8x 01 04 08 3p ff	
Focus_Direct	8x 01 04 48 0p 0q 0r 0s ff	pqrs: focus position
Focus_Auto	8x 01 04 38 02 ff	Autofocus mode on/off. NOTE: If mode is auto, camera may disable autofocus when focus is ok. Autofocus will be turned back on when camera is moved using Zoom_Tele/ Wide, PT_Up/Down/Left/Right. Ditto for IR_CameraControl movement.
Focus_Manual	8x 01 04 38 03 ff	
PT_Stop	8x 01 06 01 03 03 03 03 ff	
PT_Reset	8x 01 06 05 ff	Reset pan/tilt to center position. Will also re–synchronize motors.
PT_Up	8x 01 06 01 0p 0t 03 01 ff	p pan speed t: tilt speed Right -> increment pan Left -> decrement pan Up -> increment tilt Down -> decrement tilt
PT_Down	8x 01 06 01 0p 0t 03 02 ff	
PT_Left	8x 01 06 01 0p 0t 01 03 ff	
PT_Right	8x 01 06 01 0p 0t 02 03 ff	
PT_UpLeft	8x 01 06 01 0p 0t 01 01 ff	
PT_UpRight	8x 01 06 01 0p 0t 02 01 ff	
PT_DownLeft	8x 01 06 01 0p 0t 01 02 ff	
PT_DownRight	8x 01 06 01 0p 0t 02 02 ff	

Command	Command Packet	Comments
PT_Direct	8x 01 06 02 0p 0t 0q 0r 0s 0u 0v 0w 0x 0y FF	p: max pan speed t: max tilt speed qrsu: pan position vwxy: tilt position Attempts to linearize movement.
PTZF_Direct	8x 01 06 20 0p 0q 0r 0s 0t 0u 0v 0w 0x 0y 0z 0g 0h 0i 0j 0k ff	NOTE: Never route this message through Sony cameras. Sets all motors in one operation. pqrs: pan tuvw: tilt xyzg: zoom hijk: focus Attempts to linearize movement for pan and tilt.
PT_Limit_Set	8x 01 06 07 00 0x 0p 0q 0r 0s 0t 0u 0v 0w ff	x=1: Up/Right x=0: Down/Left pqrs: Pan limit tuvx: Tilt limit. This command is valid only to next boot.
PT_Limit_Clear	8x 01 06 07 01 0x [...] ff	x=1: Up/Right x=0: Down/Left Sony specifies lots of filler bytes after 0x. Ignore them.

The VISCA™/RS–232 control protocol, cont...

Inquiries

Command	Command Packet	Response
CAM_ID_Inq	8x 09 04 22 ff	Resp: 90 50 zz xx 00 yy ff Only zz, which identifies the camera, is relevant. zz = 0x50 for this camera.
CAM_SWID_Inq	8x 09 04 23 ff	Resp: y0 50 [1-125 bytes ASCII SWID] ff. Never route this message through Sony cameras.
CAM_HWID_Inq	8x 09 04 24 ff	The response is the Module Serial Number stored in EEPROM. The number is converted to ASCII : y0 50 [12 bytes ASCII HWID] ff.
Zoom_Pos_Inq	8x 09 04 47 ff	Resp: y0 50 0p 0q 0r 0s ff pqrs: zoom position
Focus_Pos_Inq	8x 09 04 48 ff	Resp: y0 50 0p 0q 0r 0s ff pqrs: focus position
Focus_Mode_Inq	8x 09 04 38 ff	Resp: y0 50 0p ff p=2: Auto, p=3: Manual
PanTilt_Pos_Inq	8x 09 06 12 ff	Resp: y0 50 0p 0q 0r 0s 0t 0u 0v 0w ff pqrs: pan position tuvw: tilt position
Power_Inq	8x 09 04 00 ff	Resp: y0 50 0p ff p=2: On, p=3: Off
WB_Mode_Inq	8x 09 04 35 ff	Resp: y0 50 0p ff p=0: Auto , p=6: Table manual
WB_Table_Inq	8x 09 04 75 ff	Resp: y0 50 0p 0q 0r 0s ff pqrs: Table used if table mode
AE_Mode_Inq	8x 09 04 39 ff	Resp: y0 50 0p ff p=0: Auto, p=3: Manual
Backlight_Mode_Inq	8x 09 04 33 ff	Resp: y0 50 0p ff p=2: On, p=3: Off
Mirror_Inq	8x 09 04 61 ff	Resp: y0 50 0p ff p=2: On, p=3: Off
Flip_Inq	8x 09 04 66 ff	Is video flipped or not? Resp: y0 50 0p ff p=2: On , p=3: Off

Command	Command Packet	Response
Gamma_Mode_Inq	8x 09 04 51 ff	Resp: y0 50 0p ff p=2: Auto, p=3: Manual
Gamma_Table_Inq	8x 09 04 52 ff	Resp: y0 50 0p 0q 0r 0s ff pqrs: Gamma table in use if manual mode.
Call_LED_Inq	8x 09 01 33 01 ff	Resp: y0 50 0p ff p=2: On, p=3: Off, p=4: Blink
Power_LED_Inq	8x 09 01 33 02 ff	Resp: y0 50 0p ff p=2: On, p=3: Off
Video_System_Inq	8x 09 06 23 ff	y0 50 0p 0q 0r 0s ff pqrs=video mode currently being output on the HDMI port. See chapter on DIP switches.
DIP_Switch_Inq	8x 09 06 24 ff	y0 50 0p 0q 0r 0s ff pqrs contains the bit pattern of the DIP switch. See chapter on DIP switches.
IR_Output_Inq	8x 09 06 08 ff	Resp: y0 50 0p ff p=2: On, p=3: Off
ALS_RGain_Inq	8x 09 50 50 ff	Ambient Light Sensor Resp: y0 50 0p 0q 0r 0s 0t 0u 0v 0w ff pqrstuv=32 bit unsigned integer, relative gain value. The integration time is a constant set in the camera SW.
ALS_BGain_Inq	8x 09 50 51 ff	
ALS_GGain_Inq	8x 09 50 52 ff	
ALS_WGain_Inq	8x 09 50 53 ff	
Up side down_Inq	8x 09 50 70 ff	Resp: y0 50 0p ff p=0: Camera is upright. p=1: Camera is upside down.

The VISCA™/RS–232 control protocol, cont...

Software upload commands

The CRC algorithm used, is the same as in the XModem protocol. CRC for the last data packet is only calculated for the actual data bytes in the packet. Pad last packet with 0x00 so that the data section is 256 bytes long. The PacketID counter starts at 0.

Command set	Command packet	Comments
SW start	8x 01 50 a2 0p 0q 0r 0s 0t 0u 0v 0w ff	pqrstuvw = size, pq=LSB Returns y050ff if ok. Fatal errors: Returns y06006ff if upload already in progress. Returns y06007ff if unable to access the flash.
SW end	8x 01 50 a1 ff	Sent after last SW packet, instructs camera to verify new application. Command may take up to 30 seconds to complete. Returns y050ff if ok. Issue a camera reboot to activate new software. Returns y06008ff if verification of sw failed.
SW abort	8x 01 50 a3 ff	Abort sw upload in progress
SW packet	8x a0 pp qq rr ss [256 bytes data]	ppqq = 16 bit packet id, pp=LSB rrss = 16 bit CRC, rr=LSB Returns y0 50 ff if packet ok. -> send next one. Returns y0 60 09 ff if crc error -> retransmit packet. Returns y0 60 0a ff if id error -> retransmit packet Fatal errors: y0 60 0b ff not in upload mode y0 60 0c ff error writing data to flash NOTE: Entire message after 8x a0... is raw data, so it may contain 0xff. Header is kept as short as possible. Never route this message through Sony cameras.

Debug commands for TANDBERG cameras

NOTE: Never route these messages through Sony cameras. They are provided for debugging on the TANDBERG PrecisionHD cameras only, and do not conform to the Visca length requirements.

Command set	Command packet	Comments
CAM_PingPong_ Reset	8x ae ff	Reset ping ctr to 0.
CAM_Ping	8x af 0p 0q 0r 0s [256 bytes data] ff	pqrs = Pingval. Camera will respond with OK if correct pingval received. Increase ctr with 1 for next packet. Data section will be dumped to stdout if it fails.
CAM_Stdin	8x a4 [0-256 bytes stdin] 00 ff	Send command to the command interpreter.
CAM_Debug_ Mode	8x 01 39 0q ff	q=0: Debug mode off. q=1: Debug mode on. Camera will send stdout as visca messages in the following format: y0 50 [0-256 bytes stdout] 00 ff

Other commands

Command set	Command packet	Comments
CAM_Boot	8x 01 42 ff	Reboot the camera. This will also reset serial speed to 9600.
CAM_Speed	8x 01 34 0p ff	p=0: Serial speed 9600. p=1: Serial speed 115200. Reply will be sent before the speed switch takes place. Please wait 20ms after ok before sending new commands.

The VISCA™/RS–232 control protocol, cont...

Video mode selection

The DIP switch selection has priority over the selection made by the ***CAM_Video_Format*** command. If the DIP switch is set to auto, the ***CAM_Video_Format*** setting will be used. If both are set to auto, resolution will be controlled automatically by EDID.

DIP Switch

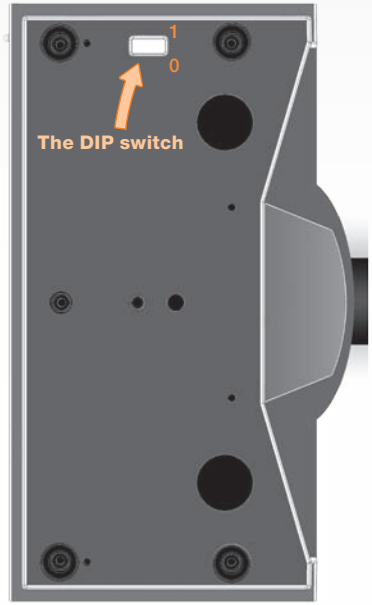
Switches are numbered 1 to 5. The VISCA column shows the value that must be used when using the ***CAM_Video_Format*** command.

NOTE: The DIP switches are only read by the SW at startup/boot. So if the DIP switches are changed the camera must be rebooted.

If an undefined mode is selected, the output will default to auto.

1	2	3	4	5	Visca	HDMI	HD-SDI
0	0	0	0	0	x	Auto*	
0	0	0	0	1	0x0000	1080p25	1080p25
0	0	0	1	0	0x0001	1080p30	1080p30
0	0	0	1	1	0x0002	1080p50	720p50
0	0	1	0	0	0x0003	1080p60	720p60
0	0	1	0	1	0x0004	720p25	720p25
0	0	1	1	0	0x0005	720p30	720p30
0	0	1	1	1	0x0006	720p50	720p50
0	1	0	0	0	0x0007	720p60	720p60
0	1	0	0	1	0x0009	SW control	

* Camera negotiates format over HDMI, HD-SDI tracks HDMI, and defaults to 1080p30 in absence of HDMI sync.



Technical specifications

TANDBERG PrecisionHD 1080p 12X/4X cameras

TANDBERG PrecisionHD 1080p 12X

- 1080p60 True High Definition
- 12 x optical zoom with smooth and quiet handling
- HDMI and HD-SDI outputs with ability to share picture simultaneously through both ports
- Mount upside down—camera orientation automatically detected and picture flipped
- 1/3" CMOS
- Pan speed: 100°/s, range: -90° to +90°
- Tilt speed: 30°/s, range: -25° to +15°
- 43.5° vertical field of view
- 72° horizontal field of view
- Focus distance 0.3m–infinity
- 1920 x 1080 pixels progressive @ 60fps
- Other formats supported (configurable through Dip-switch):
  - 1920 x 1080@60 Hz (HDMI only)
  - 1920 x 1080@50 Hz (HDMI only)
  - 1920 x 1080@30 Hz
  - 1920 x 1080@25 Hz
  - 1280 x 720@60 Hz
  - 1280 x 720@50 Hz
  - 1280 x 720@30 Hz
  - 1280 x 720@25 Hz
- Automatic or manual focus, brightness, and white balance
- Far-end camera control
- Daisy-chain support (VISCA™ protocol camera)
- Height (at max tilt): 17.2cm/6.8"
- Width: 22cm/8.7"
- Depth: 14.7cm/5.8"
- Weight: 1.8kg/3.95lbs

TANDBERG PrecisionHD 1080p 4X

NOTE! This version of the camera is available for a limited period of time.

- 1080p60 True High Definition
- 4 x optical zoom with smooth and quiet handling
- HDMI and HD-SDI outputs with ability to share picture simultaneously through both ports
- Mount upside down—camera orientation automatically detected and picture flipped
- 1/3" CMOS
- Pan speed: 100°/s, range: -90° to +90°
- Tilt speed: 30°/s, range: -25° to +15°
- 43.5° vertical field of view
- 72° horizontal field of view
- Focus distance 0.3m–infinity
- 1920 x 1080 pixels progressive @ 30fps
- Other formats supported (configurable through Dip-switch):
  - 1920 x 1080@30 Hz
  - 1920 x 1080@25 Hz
  - 1280 x 720@30 Hz
  - 1280 x 720@25 Hz
- Automatic or manual focus, brightness, and white balance
- Far-end camera control
- Daisy-chain support (can only be in the end of a chain)
- Height (at max tilt): 17.2cm/6.8"
- Width: 22cm/8.7"
- Depth: 14.7cm/5.8"
- Weight: 1.8kg/3.95lbs

TANDBERG PrecisionHD 720p camera

- 720p30 High Definition
- 7 x optical zoom with fast and smooth video handling
- 1/3" CMOS
- Pan range: -90° to +90°
- Tilt range: -20° to +10°
- 42° vertical field of view, 72° total vertical field of view
- 70° horizontal field of view, 250° total horizontal field of view
- Focus distance 0.3m–infinity
- 1280 x 720 pixels progressive @ 30fps
- Automatic or manual focus, brightness, and white balance
- Far-end camera control
- Daisy-chain support (Visca protocol camera)
- 15 near and far-end camera presets
- Voice-activated camera positioning
- In-call LED light display
- Power indicator
- Auto iris sensor
- Height (at max tilt): 16.7cm/6.6"
- Width: 22.2cm/8.8"
- Depth: 14.5cm/5.7"
- Weight: 1.7kg/3.75lbs

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